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ABSTRACT

The joint effects of institutional and environmental factors on college enrollments on a year-to-year basis were investigated. The study population included all public and private two- and four-year colleges and universities who completed the Higher Education General Information Survey for 1975-1976 through 1980-1981. Four major environmental factors constraining enrollments were assessed: the size of the pool of potential students, the availability of resources for individuals wishing to enroll, the level of economic wealth within a region, and the level of economic activity within the region. Five institutional factors were also evaluated: program emphasis, size of the region served, admissions selectivity, type of clientele served, and price. For public institutions, federal student aid and the levels of economic wealth and activity significantly affected enrollments. In addition, institutional selectivity and the type of clientele served, as measured by aptitude scores and the proportion of part-time students, were significant predictors of future enrollments. Idiosyncratic institutional factors seem to account for most of the variation in changes in enrollments among institutions. The enrollments of private institutions were relatively stable, and for the most part, appeared to be insulated from environmental conditions. (SW)

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THE EFFECTS OF INSTITUTIONAL AND ENVIRONMENTAL FACTORS ON ENROLLMENTS

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THE EFFECTS OF INSTITUTIONAL AND ENVIRONMENTAL FACTORS ON ENROLLMENTS

Abstract

This study employed a pooled cross-sectional time-series regression design to examine the impact of a number of institutional and environmental factors on college and university enrollments between 1975-76 and 1980-81. Five institutional factors (program emphasis, size of region served, admissions selectivity, type of clientele served, and price), four environmental factors (size of the pool of potential students, availability of student aid resources, level of economic wealth, and level of economic activity), and a lagged enrollment variable were included in the analyses. Separate analyses for four-year public, four-year private, two-year public, and two-year private institutions revealed that the effects of the institutional and environmental factors on enrollments varied by institutional type and control.

THE EFFECTS OF INSTITUTIONAL AND ENVIRONMENTAL FACTORS ON ENROLLMENTS

College and university administrators are faced with a high degree of uncertainty when thinking about the 1980s. Unlike the 1960s when growth was almost assured because of annual increases in the size of the 18-21 year old population and an abundance of funds from governmental and private sources, the 1980s appears to be a period of potential decline. Projections show that the size of the 18-21 year old population will decrease through the 1990s, which is likely to be manifested in reduced enrollments. The stagnation of the economy and the changing role of government in American society are creating uncertainty about the availability of financial resources from both the public and private sectors.

Many individuals have speculated about the prospects for colleges and universities during the 1980s. These visions of the future of higher education vary widely. Boulding (1975) and Dresch (1974), for example, have presented "pessimistic" views of the future which foresee rapidly declining enrollments. Their opinions are primarily based on demographic trends. Other authors, such as Frances (1980a), Leslie (1980), and Leslie and Miller (1974), have presented more "optimistic" views of the future in which institutional enrollments and revenues decline slightly or stabilize at current levels. The opinions of these authors are based on the perception that colleges and universities can adapt to changing environmental conditions by modifying their missions, programs, technologies, and clients served.

Moreover, a number of studies suggest that certain institution-specific factors will moderate the impact of environmental

conditions on institutional enrollments and revenues. Leslie, Grant, and Brown (1981), the Carnegie Council (1980), and Brown, Grant, and Leslie (1979), for example, have suggested that more selective institutions will be affected less by reductions in the size of the 18-21 year old population than will their less selective counterparts. Zammuto (1982) has argued that institutions with more diverse programs are likely to experience greater stability in enrollments than are less diverse institutions as students' interests in fields of study change.

The size of the geographic region served by an institution also may moderate the effects of economic conditions on institutional enrollments and revenues. Studies by Rusk, Leslie, and Brinkman (1982) and by Zammuto (1983) suggest that the larger the geographic region served by an institution, the less susceptible the institutional enrollments appear to be to fluctuations in local economic conditions. Other institutional features, such as the price elasticity of tuition and fees (Jackson and Weathersby, 1975), the level of competition among institutions for students (Zemsky, Shaman and Berberich, 1980; Rowse and Wing, 1982), efforts to recruit part-time students (Mingle and Norris, 1981), and so on, have an impact on how the effects of environmental conditions are manifested in changes in institutional enrollments and revenues.

While it is evident that a large body of speculative and empirical information has been generated, essentially no research has been done on the joint effects of institutional and environmental factors on institutional enrollments or revenues. Most studies, such as those cited, have examined one or two variables in relation to enrollments and revenues and then only for a small number of selected institutions.

Hence, there appears to be no empirical data indicating the relative impact of both these factors on either the system of higher education, or on different types of institutions within the system.

The study reported herein attempts to fill part of this void by simultaneously examining the impact of institutional and environmental factors on year-to-year changes in college and university enrollments. The sample includes 2,101 colleges and universities for which complete data were available for the academic years 1975-76 through 1980-81 from the Higher Education General Information Survey (HEGIS). Comparisons are made between two and four-year institutions in both the public and private sectors. The results of these comparisons are intended to help determine how both institutional and environmental factors have, and may continue to affect institutional enrollments. The following section presents the theoretical framework on which the study is based and an overview of previous research.

Theoretical Framework

The predictions about the future of higher education discussed in the introduction reflect two differing perspectives in organization-environment relations. The "pessimistic" views reflect the reasoning inherent in the population ecology model of organizations (Hannan and Freeman, 1977; Aldrich, 1979; Brittian and Freeman, 1980). Decreases in the size of the traditional college-age population are viewed as having an inexorable effect on college and university enrollments. As the supply of potential students decreases, the enrollments of colleges and universities also will decrease.

The population ecology model is derived from the literature on evolutionary processes in biology. As its name implies, it focuses on

changes in a population of organizations rather than the behavior of individual organizations. Different forms of organization within a population are viewed as variations, some of which are selected and retained within the population as its environment evolves. The result of the process over time is the survival of organizations that exhibit characteristics that best fit the constraints imposed on the population by its environment. Thus, by examining changes in a population over time, an understanding of the features that made some organizations more adaptive than others can be gained. (For a more detailed treatment of the model's application to higher education, see Birnbaum, 1982).[1]

In contrast, the more "optimistic" views of the future reflect a strategic management perspective of organization-environment relations (Child, 1972; Hofer and Schendel, 1978; Kotler and Murphy, 1981). Within this paradigm, organizations are viewed as being able to avoid the inexorable effects of environmental change by tracking the environment and responding to it. In effect, organizations are able to manipulate the impact of changing environmental conditions by the way they position themselves within that environment. Environmental scanning, strategic planning, innovation, and marketing are some of the managerial tools used to accomplish this end.

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[1]The population ecology model has proved useful in studying different aspects of change within educational systems. For example, Birnbaum (1982) has used the model to study changes in the diversity of American higher education, and to examine the implications of these changes for the future viability of the higher education system. Nielsen and Hannan (1977) and Carroll (1981) have studied variations in enrollment growth across national educational systems using the population ecology model. Freeman and Hannan (1975) and Hannan and Freeman (1978) have applied the model to the study of differences in the organizational structure of school systems under conditions of enrollment growth and decline.

The purpose of the following analysis is not to determine whether one or the other of the approaches is correct. Indeed, Birnbaum (1982) has shown that neither type of approach is sufficient for explaining the dynamics of change within higher education. Rather, the study treats the approaches as being complimentary. The environment is viewed as creating the context within which colleges and universities operate. By examining the interplay of institutional and environmental factors, the relative importance of each in affecting college and university enrollments can be determined.

Environmental Factors

The first step in this study was to define the relevant institutional environment. The literature suggests the four major environmental factors that constrain college and university enrollments are: 1) the size of the pool of potential students, 2) the availability of resources for individuals wishing to enroll, 3) the level of economic wealth within a region, and 4) the level of economic activity within a region. The following section briefly outlines the results of research concerning these four factors and how they affect enrollments.

The size of the pool of potential students is a major determinant of college and university enrollments. During the 1970s, over 90 percent of the full-time students were from the 18-21 year old age group (Tierney, 1982). Demographic projections show that the size of the 18-21 year old population will decrease substantially over the next decade. Nationally, there will be about a 20 percent decrease from 1980 through 1990 (U.S. Bureau of the Census, 1975). Further decreases will also occur during the first half of the 1990s before the size of

this age group begins to increase during the latter half of that decade. Compounding the effects of the national decline in the size of this age group are regional variations in birth rates and migration patterns. Some states in the sunbelt will have an increasing number of 18-21 year olds, other states in the midwest and northeast will experience 30 to 40 percent decreases.

An analysis of college participation rates by Tierney (1982) illustrates the magnitude of the impact that the reduction in the size of the 18-21 year old population may have on institutional enrollments. He notes that in order to maintain current levels of enrollments nationally through the 1980s, the participation rate for this age group, which was approximately 32 percent in 1979, would have to increase by eight percentage points (or 25 percent) by the end of the decade. Given the magnitude of the decline, it is unlikely that increasing part-time enrollments will be able to totally offset the decline in number of traditional full-time students. Thus the predictions of declining enrollments that are found in the literature.

While the size of the 18-21 year old population provides one indication of the resourcefulness of the college and university environment, other resource factors also need to be taken into account. Other relevant factors are those that affect individuals' decisions on whether to attend college or pursue some other alternative. The rational investment model, which has been used by economists to explain changes in enrollments, is a useful framework for examining the three remaining variables: the resources available to potential students, the level of wealth and the level of economic activity within a region.

Using the rational investment model, Becker (1975) estimated that the return on investment for college attendance ranged between 12 and 15 percent during the late 1950s and 1960s. The rate of return decreased to 7.5 percent by the mid-1970s (Freeman, 1976), and continued to decline throughout the latter half of the decade (Tierney, 1982). The effect of a decreasing rate of return on investment from a college education is that it made employment an attractive alternative for many potential students. In turn, institutional enrollments became more sensitive to changes in economic conditions (Rusk, Leslie, and Brinkman, 1982).

The availability of student aid and the levels of wealth and economic activity are three factors that appear to influence the perceived rate of return of attending college. Student aid from state and federal sources has the effect of lowering the cost of obtaining a college degree, increasing the perceived rate of return. For example, Leslie (1978) has estimated that the availability of federal student aid added about 250,000 students to private institutional enrollments during 1975-76. The impact of federal student aid on enrollments became even more accentuated during the late 1970s as the amount of funds available increased and as the limits on awards were adjusted upward.

The levels of economic wealth and activity within a region also influence the attractiveness of employment as an alternative to attending college. The level of economic wealth, as represented by average weekly earnings in this study, provides a general indication of the average value of employment as an alternative to attending college. Within the framework of the rational investment model, it is expected

that the higher the level of economic wealth within a region, the lower the potential return on college attendance because of the opportunity costs involved.

The level of economic activity within an area also is related to the perceived opportunity costs of attending college. Rusk, Leslie, and Brinkman (1982) found a negative relationship between the level of economic activity in the economy and institutional enrollments during the 1970s. Similarly, Tierney (1982) found a positive relationship between participation rates and unemployment. Simply stated, college attendance is viewed by many potential students as an alternative to unemployment. Therefore, it is expected that institutional enrollments will increase as economic conditions deteriorate.

Taken together, these four factors provide a general outline of the college and university enrollment environment. They define that supply of new traditional, full-time students and the environmental conditions that affect the decision of potential students on whether to attend college. Generally, it is expected that an increasing supply of potential students, increasing resource availability to potential students, and lower levels of economic wealth and activity will positively effect year-to-year changes in institutional enrollments.

Institutional Factors

While these demographic and economic factors have been shown to have a significant impact on enrollments, institutional factors will affect each institution's sensitivity to changing environmental conditions. In other words, environmental conditions are likely to have more of an impact on some institutions' enrollments than on others because of the way institutions position themselves within the

environment. The five institutional factors selected for inclusion in this study represent aspects of the institution's domain of operation (Meyer, 1975), or of the market that the institution serves. These factors are: 1) program emphasis, 2) size of the region served, 3) admissions selectivity, 4) type of clientele served, and 5) price. The effects of each of these factors on institutional enrollments are discussed in the following sections.

1. Program emphasis. Students interests in fields of study vary over time. During the late 1960s student preferences began to shift away from the liberal arts and sciences, education, and theological training to the professions and applied sciences (National Center for Education Statistics, 1980: 131). Many institutions adapted to changing student interests by adding programs and by reallocating resources to existing programs in which interest was increasing. For example, an analysis of HEGIS earned degree data shows that the number of masters' degrees awarded in management and business administration increased from 11,728 degrees in 1971-72 to 30,056 degrees in 1979-80. Similarly, the number of institutions awarding such degrees increased from 191 institutions in 1971-72 to 384 institutions in 1979-80. Thus the general expectation is that institutions offering programs in areas of increasing student interests are less likely to experience declining enrollments than are institutions with an emphasis in areas of declining interest.

2. Size of recruiting area. The size of the area from which an institution recruits students is likely to affect its sensitivity to the effects of demographic and economic factors (Zammuto, 1983). As state-by-state analysis of demographic trends shows, some states will

experience a greater decrease in the size of the 18-21 year old population than will others (for example, see McConnell, 1979). Similarly, economic conditions vary on a state-by-state basis. During the 1980-83 recession, for example, states with a heavy concentration in manufacturing industries had higher levels of unemployment than did other states, particularly those with a concentration in high technology and service industries. If an institution draws its students from a diverse geographic area, it is likely to be less sensitive to localized changes in demographic and economic conditions than is a comparable institution recruiting students from a more concentrated area. Therefore, it is expected that the broader the geographic area that an institution recruits from, the smaller the year-to-year variations it will experience in enrollments as a result of fluctuating environmental conditions.

3. Selectivity. The results of several research studies suggest that an institution's selectivity in admitting students will be related to changes in enrollment. For example, Leslie et al. (1981) and Brown et al. (1979) found that the enrollments of more selective research universities and liberal arts colleges were less prone to decline than were the enrollments of less selective institutions. Similarly, the Carnegie Council (1980) predicted that less selective liberal arts institutions are the most vulnerable to declining enrollments during the 1980s, a prediction reflecting both the factors of program emphasis and selectivity. Davis (1975) suggests that selectivity will also be a factor in enrollment change as competition between institutions for potential students increases. He argues that as competition increases, students will "shop up" from less selective to more selective

institutions, which would be negatively reflected in the enrollments of the less selective institutions. Thus the literature suggests that admissions selectivity will be positively related to increases in institutional enrollments.

4. Type of clientele served. The literature suggests that an institution's relative emphasis on full-time versus part-time students is an important determinant to a declining traditional college-age student population. Leslie and Miller (1974), for example, have suggested that one potential institutional response to declining full-time enrollments is increasing the enrollments of typically older, part-time students. Indeed, part-time enrollments have become an increasingly important part of aggregate institutional enrollments during the 1970s. For example, Mingle (1981) reported that older, part-time students comprised 51 percent of the 2.4 million increase in aggregate institutional enrollments between 1970 and 1978. The Carnegie Council (1980) has also reported that a substantial number of colleges and universities have modified their programs and schedules in order to attract part-time students. Thus it is expected that the greater an institution's emphasis on part-time enrollments, the more likely the institution is to exhibit increases in year-to-year enrollments as compared to institutions that primarily recruit traditional, full-time students.

5. Price. Jackson and Weathersby (1975) concluded from their review of studies examining the relationship between price and the demand for higher education that a negative relationship exists between price and the probability that a student will attend a particular institution. Thus, as a general relationship, it is expected that

institutions that charge higher tuition and fees are more likely to experience declining enrollments than those with lower tuition and fees. We expect this effect to be most pronounced in the private sector which typically charges higher tuition fees.

METHODOLOGY

Study Design

A multiple regression design was employed to assess the relative effects of institutional and environmental factors on enrollments in different types of institutions. The sample included 2,101 colleges and universities which reported HEGIS data between academic years 1975-76 and 1980-81. Separate analyses were run for public four-year, private four-year, public two-year, and private two-year institutions. To capitalize on the availability of data, each institution was treated as a separate case for each year in which complete data was available. This analytical format assumes that the year-to-year dynamics of change remained the same, and it has the advantage of increasing the efficiency of the regression estimates. Hence, an institution with complete data for all years between 1975-76 and 1980-81 contributed six observations to the total sample of observation.

Two sets of independent variables were used to model enrollments. As noted in the previous section five factors were used to describe environmental conditions. The variables used to operationalize these concepts were: 1) the number of 18 year olds in the state in which an institution was located (size of the pool of potential new students), 2) the unemployment rate for the state in which an institution was located (level of economic activity), 3) the constant dollar average

weekly earnings for the state in which an institution was located (level of economic wealth), 4) state aid to higher education in constant dollars (availability of resources for individuals wishing to enroll), 5) federal aid to higher education in constant dollars (availability of resources for individuals wishing to attend). The nature of the first four variables were such that every institution in the same state had the same score in a given year. All institutions were assigned the same value for federal student aid for a given year.

The second set of factors represented an institution's position within its environment, or the institution's domain (Meyer, 1975; Miles and Cameron, 1982). The five variables used to operationalize institutional domain were: 1) the ratio of part-time to total students (type of clientele served), 2) in-state undergraduate tuition and fees (price), 3) institutional average total SAT verbal and math scores for entering freshmen (selectivity), 4) percent of institutional degrees in the humanities, social sciences, and education (program emphasis), and 5) the ratio of in-state undergraduate full-time equivalent (FTE) students to total FTE students (market scope).

A lagged enrollment variable was also included as a predictor. This was done because enrollment at an institution was assumed to be, in part, a function of its value at previous points in time. Models including such terms are referred to as dynamic lag models (Nerlove, 1971). Operational descriptions of the variables, level of aggregation, and data sources are described in Table 1.

The pooling of cross-section and time-series data creates a number of analytical problems. Following Kmenta (1971: 508), the regression model for such data may be written as,

$$Y_{it} = \beta_1 X_{it,1} + \beta_2 X_{it,2} + \ldots + \beta_k X_{it,k} + \varepsilon_{it} \quad (i=1,2,\ldots,N;\ t=1,2,\ldots,T)$$

The sample data are represented by observations on N cross-section units over T periods of time. The assumptions of the classical linear regression model require that

$$E(\varepsilon_{it})^2 = \sigma_\varepsilon^2 \quad \text{for all } i \quad \text{(homoscedasticity)}$$

$$E(\varepsilon_{it}\,\varepsilon_{jt}) = 0 \quad \text{for all } i \neq j \quad \text{(cross-sectional independence)}$$

$$E(\varepsilon_{it}\,\varepsilon_{it-1}) = 0 \quad \text{(non-autocorrelation)}$$

However, as a consequence of combining time-series and cross-section data, disturbances may be time-series related (i.e., autocorrelated), cross-sectionally related (i.e., heteroscedastic), and a combination of both.

Several statistical procedures have been suggested for dealing with such problems. These include application of generalized least squares models, error components models, and covariance models (Kmenta, 1971; Pindyck and Rubinfeld, 1981; Fuller and Battese, 1974; Maddala, 1971; Zellner, 1962). The covariance model was adopted for this study because: 1) it yields estimates which are unbiased, consistent, and asymptotically efficient (Hannan and Young 1977); 2) it yields estimates which are at least as good as those derived from the other procedures (Balestra and Nerlove, 1966; Wallace and Hussain, 1969; Maddala, 1971; Hannan and Young, 1977); and 3) unlike the other procedures, the model could be implemented with statistical routines that were readily available to us and which could accommodate large datasets. The complete dataset contained more than 12,000 observations which made use of the other procedures almost impossible for cost and computational reasons.

The covariance model employed is essentially an ordinary least squares paradigm with dummy variables for each cross-section unit. The dummy variables serve to adjust both endogenous and exogenous variables for differences in the average enrollment level of each cross-section unit--which, if otherwise unaccounted for, would lead to serious heteroscedasticity.

Judge, Hill, Griffiths, Lutkepohl, and Lee (1982: 480) demonstrate that the use of dummy variables in this model is equivalent to computing cross-section unit means for each variable and then applying ordinary least squares to the deviations of each observation around its corresponding unit means. This procedure is virtually mandatory when N is large because of the computational problems that arise from having to invert the data matrix. Data treated in this manner have essentially been subjected to a transformation which partials the dummy covariates out of both the endogenous and exogenous variables. The resulting deviation or residual scores may then be analyzed with a simple ordinary least squares model. Resulting estimates must, however, be corrected for 1) degrees of freedom lost to dummy covariate estimation, and 2) reduced variable standard deviations resulting from the use of deviation scores as opposed to raw scores.

Results

Estimated standardized regression coefficients for the truly exogenous variables, are shown in Table 2. Squared multiple correlations and changes in these correlations for specified step-down models are shown in Table 3. The use of a step-down procedure has no effect on estimation of coefficients once all variables have been entered. The procedure does, however, allow for an assessment of the

relative contribution of different variables or sets of variables after controlling for those previously entered.

By virtue of the mathematical procedure employed, the dummy covariates were entered first. The one major drawback of the computational procedure used is that there is no way of obtaining an estimate of the multiple correlation between the endogenous variable and the dummies. Hence the question marks in the first row of Table 3. At the same time, however, we observed that the correlation between enrollment at time T and time (T-1) was always greater than .98. We can be certain, therefore, that the minimum total R^2 for each sample was at least .96, as shown in the last line of Table 3.

The lagged enrollment variable was entered next. Since the dummy covariates controlled for differences in average enrollment levels, this variable served to control for the effect of overall institutional size on year-to-year changes in enrollment. That is, it accounted for the fact that a one percent change in enrollment at a large institution translates into many more students than a one percent change at a small institution. Estimated effects of the remaining exogenous variables on enrollment are, therefore, free of the effects of differences in average and overall institutional size.

Inspection of the standardized regression coefficients in Table 2 indicates that the lagged enrollment variable was the strongest predictor of enrollment change in four-year institutions.[2] While

[2]The reader is reminded that the standardized regression coefficients for a given model and sample are adjusted for differences in measurement scales. Hence, they more directly provide an indication of the relative importance of variables in each specific analysis. This means, however, that comparison of the magnitude of standardized coefficients for the same variables across the different samples is inappropriate.

not shown the unstandardized regression coefficients suggest that approximately half of four-year institutions' enrollment gains or losses are predictable from gains or losses during the previous year. The unstandardized coefficients for two-year institutions (both public and private) were approximately .25. Hence, the inertia factor, as it might be referred to, seems to play a lesser role in the two-year sector.

Simply comparing the number of environmental variables that were significant in the public and private sectors indicates that environmental conditions are far more influential in the public sector. This finding suggests that enrollments in private institutions were relatively insulated from the effects of environmental events during the late 1970s. The one major qualification concerns the effects of federal student aid—which is a significant predictor in both public and private four-year institutions. Our calculations suggest that, other things being equal, each million dollars of federal student aid (in 1972 constant dollars) spent in the private four-year sector added 136 students to the system. In other words, the data suggest that it took approximately $7358 of federal student aid to add a student to the private four-year sector. The regression coefficient for federal student aid in the public four-year sector suggests that each million dollars added 377 students to the system. This translates into approximately $2649 per student in 1972 constant dollars.

As previously noted, environmental factors appear to affect public institutions far more than private schools. The results for the public four-year sector indicate that enrollments in these institutions can be expected to increase as the level of economic activity (employment

opportunities) in an area decreases; and decrease as the level of economic wealth (average weekly earnings) in an area increases. The lack of a similar effect for private four-year institutions may be related to the fact that they recruit more students from higher income families than do public institutions (for example, see Astin, King and Richardson, 1980: 48). This may buffer their enrollments, to some extent, from fluctuating economic conditions.

The similarities and differences between public four and two-year institutions seem reasonable in view of what we know about these institutions. The costs of attending two-year institutions are generally so low that we would not expect student aid to be a determining factor in students' decision to matriculate. Conversely, it is reasonable to expect that students attending public two-year schools, like their counterparts in public four-year schools, would be sensitive to economic conditions as reflected by employment (more precisely, unemployment) conditions and both potential and foregone earnings (i.e., average weekly earnings).

At first glance, the most curious finding in the study is the significant negative coefficient (B=-.52) for the number of 18 year olds in a state for public two-year schools. The coefficient suggests that as the number of 18 year olds increased, enrollments decreased. In fact, what actually happened was that the number of 18 year olds decreased slightly between 1975-76 and 1980-81 in a number of states while the number of students attending two-year institutions increased significantly.

In accord with the precepts of the population ecology model, the organizational variables included in the study were hypothesized to be

less important than the environmental variables in their affect on enrollments. In addition, both sets of variables were expected to be more influential in the private sector. However, contrary to expectation, whatever effects these variables did have, they were stronger in the public sector. The only organizational variable which was statistically significant for the private four-year institutions was the percent of degrees in the humanities, social sciences, and education. The negative coefficient for this variable (B=-.02) suggests that the greater an institution's concentration in areas of declining student interest, the lower its enrollments. The only organizational level variable which was significant for private two-year institutions was the percent of in-state undergraduate students (B=.09). This suggests that private two-year institutions benefited to the extent that they served in-state rather than out-of-state students.

As previously noted, institutions in the public sector appeared to be slightly more affected by organizational factors than private institutions. The enrollments of public four-year institutions appear significantly affected by their tuition charges (B=-.02), and commitment to the education of part-time students (B=.02). These findings suggest, other things being equal, that 1) increases in tuition resulted in reduced enrollments; and, 2) the more institutions allowed or provided programs for part-time students, the more likely they were to have increased enrollments. The enrollments of public two-year institutions were also directly affected by their willingness to serve part-time students (B=.05).

DISCUSSION

Simple observation of the pattern of significant and nonsignificant regression coefficients in Table 2 indicates that the variables included in the analyses are not good predictors of institutional enrollments, particularly in the case of private institutions. The results for private institutions indicate that their enrollments are relatively stable and appear to be somewhat insulated from environmental conditions. The important exception was the contribution of federal student aid in the private four-year sector. Differences in the income levels of families of students attending private institutions may account, at least in part, for the relative lack of affect of environmental factors on institutional enrollments. Students from higher income families may be more likely to attend private institutions, and their decision to attend may be less affected than students from lower income families by changing economic conditions. Hence, private institutions may draw a significant portion of their enrollments from a relatively stable pool of potential students. Also surprising was the finding that admissions selectivity did not have an effect on enrollments in private, or for that matter, public institutions, since earlier research strongly suggests that selectivity is a major factor in determining future enrollments (Carnegie Council, 1980; Leslie, Grant, and Brown, 1980).

In contrast, findings for public institutions were much more in line with the expectations created by previous research. The environmental factors of federal student aid and the levels of economic wealth and activity were found to have significant effects on the enrollments of public institutions. On the organizational side, the

type of clientele served, as measured by the proportion of part-time students, and tuition and fees were statistically significant predictors of future enrollments. Thus the pattern of findings for public institutions suggest that both institutional and environmental factors affect enrollments, and that focusing on either alone is insufficient for understanding changing enrollments in public institutions.

Perhaps the most intriguing findings concern the inertia variable and the proportion of variance explained by the regressions. The findings concerning the effects of the previous year's enrollments on current enrollments suggest that enrollments dynamics are driven largely by momentum, but at a decreasing rate over time. As such, institutional enrollments tend toward a steady state or equilibrium level, all other things being equal. This means that institutions with growing enrollments in one year are likely to experience growing enrollments in later years but at a decreasing rate. Similarly, institutions with declining enrollments are likely to continue to experience declining enrollments during later years but at a decreasing rate.

Examining the influence of the institutional and environmental variables within this context gives rise to another interpretation of their effects. These variables seem to represent factors that perturb the system, keeping it from settling into an equilibrium state. The changes that are caused by these factors are likely to ripple through into later years because of the momentum of institutional enrollments over time. Hence, it might be concluded that the institutional and environmental factors employed are significant predictors of

year-to-year changes in enrollments. They are important in that they influence the direction of enrollment change, and the direction of this influence is accentuated by the momentum of enrollments over time.

The finding concerning the amount of variance explained by the institutional and environmental factors is also of interest in that it is relatively low. The adjustments used to control for heteroscedasticity, in effect, controlled for idiosyncratic differences among institutions. The results suggest that in the models specified, idiosyncratic institutional differences represent the most powerful factor influencing institutional enrollments. The implication is that the enrollments of individual institutions cannot be adequately represented using a global model for the purpose of prediction. Rather, it appears that predictive models need to be tailored for each particular institution in order to create a tool that has sufficient predictive validity to be useful.

In sum, the results of the study indicate that various institutional and environmental factors do affect enrollments. The findings also indicate that the effects of these factors are most apparent for the enrollments of public institutions. The results also suggest that idiosyncratic institutional factors account for most of the variation in enrollments among institutions. The importance of this result is that prediction about the future of higher education through the 1980s is apparently more complex than has been portrayed in the literature. While some institutions will grow and others will fail during the 1980s, it is not possible to determine with any degree of accuracy at this time where and why growth and failure will occur using a generalized model of higher education.

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Table 1

Variables in the Analysis

Conceptual Variable	Operational Form	Level of Aggregation	Data Source
DEPENDENT VARIABLE:			
FTE Enrollments	Full-time headcount + part-time FTEs	Institutional	HEGIS Opening Fall Enrollments Survey
ENVIRONMENTAL VARIABLES:			
1. Pool of potential new students	Size of the 18 year-old population	State	U.S. Bureau of the Census (unpublished data)
2. Level of economic wealth	Annual average weekly earnings (1972 constant dollars)	State	U.S. Bureau of Labor Statistics, 1980; U.S. Bureau of the Census, 1981
3. Level of economic activity	Annual average unemployment[1]	State	U.S. Bureau of Labor Statistics, 1980; U.S. Bureau of the Census, 1981
4. Resource availability--I	State student aid per student (1972 constant dollars)	State	National Association of State Scholarship and Grants Programs
5. Resource availability--II	Federal student aid (1972 constant dollars)	National	Frances, 1980b
ORGANIZATIONAL VARIABLES:			
1. Clientele served	Part-time student FTEs/Total student FTEs	Institutional	HEGIS Opening Fall Enrollments Survey
2. Price	In-state tuition and fees	Institutional	HEGIS Institutional Characteristics Survey

Conceptual Variable	Operational Form	Level of Aggregation	Data Source
3. Selectivity	Average math and verbal SAT scores for entering freshmen[2]	Institutional	Higher Education Research Institute (see Astin and Henson, 1977)
4. Program Emphasis	Percent degrees in the humanities, social sciences, and education	Institutional	HEGIS Earned Degree Survey
5. Market Scope	Percent in-state students[3]	Institutional	HEGIS Residency and Migration Survey
6. FTE Enrollments$_{t-1}$	Full-time headcount + part-time FTEs	Institutional	HEGIS Opening Fall Enrollment Survey

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[1]The annual unemployment rate for each state was logged for this analysis. Tierney (1982) showed that the logged value of unemployment provided a better empirical and theoretical fit for the relationship between unemployment and participation rates during the 1970s.

[2]Selectivity data were available for 1973 and 1977. The values for the intervening years were interpolated. Data for later years were extrapolated using the data for 1973 and 1977 to determine institutional trends.

[3]Data were available for all students in an institution for 1972-73 and for incoming students during 1978-79. Interpolation of values for the intervening years was expected to provide an indication of the relative extent to which an institution increased or decreased its recruiting area beyond the state in which it was located.

Table 2

Estimated Standardized Regression Coefficients

Variables	Sector			
	Public 4-Year (n=425 nt=2527)	Private 4-Year (n=774 nt=4578)	Public 2-Year (n=740 nt=4159)	Private 2-Year (n=162 nt=856)
FTE Enrollment at Time t-1	.52*	.47*	.24*	.22*
Environmental Variables				
Federal Student Aid	.02*	.01*	.00	.01
State Student Aid	.00	-.01	.01	.00
Size of the 18 year old population	-.05	-.03	-.52*	-.21
Annual average weekly earnings	-.03*	.00	-.06*	-.04
Annual average unemployment	.01*	.00	.01*	.00
Organizational Variables				
Percent part-time FTE	.02*	.00	.05*	-.01
Percent degrees in humanities, social science, and education	.01	-.02*	.00	-.01
In-state tuition and fees	-.02*	-.01	.00	.02
Average freshmen SAT score	.02●	.07	.00	-.05
Percent in-state students	.01	-.01	-.01	.09*

* $p \leq .01$

● $p \leq .05$

Table 3

Estimated Squared Multiple Correlations for
Step-Down and Complete Models

Model	Step-Down R^2 and (R^2 Change)			
	Public 4-Year	Private 4-Year	Public 2-Year	Private 2-Year
Cross-section Units	?	?	?	?
FTE enrollments at time (t-1)	.36	.25	.08	.12
Environmental Variables	.38 (.02)	.26 (.01)	.11 (.03)	.16 (.04)
Organizational Variables	.40 (.02)	.26 (.003)	.13 (.02)	.17 (.01)
Estimated Total	>.96	>.96	>.96	>.96